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Meadows and more: a botanical journal of five days on the Uists, Benbecula and Eriskay

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Stewart Clarke, David Gowing, Emma Rothero & Hilary Wallace

Preamble

In the first week of July 2018, the Floodplain Meadows Partnership (FMP) held its annual steering group meeting with field excursions on the Outer Hebrides. The aim of the field part of our meeting was to familiarise ourselves with wet meadows (including those on machair) of the Uists and Benbecula, and compare their composition and ecology with related habitats further south in the UK. However, a chance for us to explore the other habitats of these islands was too good an opportunity to miss. Hence five of us arrived on the islands a few days before the main group and roamed more extensively, looking at a wide range of habitats in addition to meadows. The lead author's role in this botanical journal was to note incidental observations made in addition to the formal study of the meadows. Hilary Wallace directed the quadrat recording in wet meadows, and the overall programme of work was coordinated by David Gowing and Emma Rothero of the Open University. Even during the FMP field excursions, we could not ignore other habitats entirely and Stewart Clarke (National Trust Freshwaters and Estuaries Specialist) paid special attention to the aquatic flora.

The Floodplain Meadows Partnership

The Floodplain Meadows Partnership was formed in 2006 by a core of organisations interested in the conservation ecology of this rare and threatened habitat. Its work over the past 12 years has been primarily funded by environmental charities, such as the Esmée Fairbairn Foundation. Other organisations have joined over time and the partnership now boasts ten members, who pool their data, knowledge and information with respect to wet meadows. The membership comprises The Open University, Natural England, Natural Resources Wales, Environment Agency, National Trust, Wildlife Trusts, Centre for Ecology and Hydrology, Field Studies Council, People Need Nature and the Royal Society for the Protection of Birds.

Since its inception, the partnership has only had limited interaction with Scottish groups, in the belief that classic floodplain meadows did not occur in Scotland. However, discussions with Jane Mackintosh and, more recently, Helen Doherty from Scottish Natural Heritage (SNH), have opened our eyes to the diversity of wet grassland that does occur in Scotland and the close parallels that exist between systems such as the wet machair and ground-water-fed meadows in the rest of the UK.

The developing appreciation of the machair ecosystem prompted us to visit the Hebrides at the invitation of SNH, with whom we hope to work closely in future to characterise the diverse grasslands and support their conservation on the basis of their rich heritage, both natural and social.

The Journal

The main body of this article comprises a day by day account of our travels and the plants we observed. Within each day, the records are arranged in the order that the observations were made. These records do not represent comprehensive surveys of the places we explored, but instead are notes on species that were deemed notable in some respect – especially to botanists and ecologists visiting largely from the south of England. Most records are localised by grid reference with some notes on the location and the habitats that were present. Taxonomy follows the 3rd edition of Stace (2010), whilst names (and numbers) of vegetation types are derived from the National Vegetation Classification (Rodwell 1992, 2000). Place names follow the spelling used by the Ordnance Survey.

Some species of note were frequently observed (on all 5 days) whilst travelling around the islands.

Comarum palustre – colouring areas of mire by roads and in adjacent mires

Crocsmia x crocosmiiflora – patches on banks by roads, mainly next to habitation

Glebionis segetum – frequent in field corners, almost always where occasionally tilled

Lysimachia punctata – an introduced species, in extensive patches on banks by roads, mainly (but not exclusively) next to habitation

Nymphaea alba subsp. *occidentalis* – covering the surface of lochans and sheltered bays of larger lochs

Rosa rugosa – apparently used in hedging by habitation but spreading from such sites along roadsides

Salix viminalis – presumably planted for shelter by habitation but locally spreading

1st July 2018 (Benbecula and South Uist)

Arriving in the afternoon at the airport to a piper's welcome, we travelled along the west coast of Benbecula stopping at a lochan before crossing to South Uist in search of one of the most unusual of Hebridean plants – the American Pondweed (*Potamogeton epihydrus*). We returned to our base at the south end of Benbecula via meadows on the west coast of South Uist.

NF7855 near Benbecula Airport (Balivanich).

Prominent species of shorter roadside turf within the village and also locally southward toward Nunton.

*Anacamptis pyramidalis*¹

Geranium pratense

Dactylorhiza fuchsii subsp. *hebridensis*

Leontodon saxatilis

Galium verum

NF773250 small lochan near Loch Mor, Griminis (Benbecula).

These species occurred in shorter vegetation of the mire between lochan and minor road.

Anagallis tenella
Baldellia ranunculoides
Blysmus rufus
Caltha palustris
Carex echinata
Carex panicea
Comarum palustre
Dactylorhiza fuchsii

Eriophorum angustifolium
Juncus bulbosus
Oenanthe lachenalii
Pedicularis palustris
Samolus valerandi
Senecio aquaticus
Silene flos-cuculi
Triglochin maritima

NF7529 following a track to Loch a' Chlachain east from A865.

a) NF752294 Edges of pools near main road.

Carex arenaria
Carex disticha

Equisetum fluviatile
Juncus balticus

b) NF754292 to NF757291 undulating moor with some boggy depressions.

Botrychium lunaria
Dactylorhiza fuchsii
Dactylorhiza maculata subsp. *ericetorum*
Euphrasia scottica
Hypericum pulchrum
Narthecium ossifragum

Pedicularis sylvatica subsp. *sylvatica*
Platanthera bifolia
Potamogeton polygonifolius
Schoenus nigricans
Triglochin palustris
Veronica anagallis-aquatica

c) NF757291 sheltered bay of Loch a' Chlachain.

A very few fragments of *Potamogeton epihydrus* were found floating at the shore but we could not confirm that there were rooted plants among the other pondweed.

Eleocharis palustris
Littorella uniflora
Lobelia dortmanna

Menyanthes trifoliata
Nymphaea alba subsp. *occidentalis*
Potamogeton natans

d) NF757291 shores and banks of inlet of Loch a' Chlachain.

Anthoxanthum odoratum
Drosera rotundifolia
Dryopteris aemula
Festuca vivipara
Molinia caerulea

Ophioglossum vulgatum
Pinguicula vulgaris
Platanthera bifolia
Selaginella selaginoides

NF736345 - the meadows between Loch Altabrug and Loch a Mhoil, overwhelmingly forb-dominated.

Angelica sylvestris
Dactylorhiza fuchsii
Dactylorhiza incarnata subsp. *coccinea*
Dactylorhiza incarnata subsp. *incarnata*
Dactylorhiza x kerneriorum

Potentilla anserina
*Ranunculus acris*²
Rumex acetosa
Vicia cracca

2nd July 2018 (North Uist and Benbecula)

NF797485 within the grounds of Isle of Benbecula House Hotel, including gravel and waste ground.

<i>Anthyllis vulneraria</i> subsp. <i>vulneraria</i>	<i>Euphorbia peplus</i>
<i>Crepis capillaris</i> ³	<i>Hypochaeris radicata</i>
<i>Epilobium montanum</i>	<i>Juncus bufonius</i> sens. strict.
<i>Epilobium parviflorum</i>	

Our journey took us onto North Uist, focussing mainly on machair on the north coast of that island but returning to look at a rich wet meadow site near Nunton on Benbecula.

Schoenoplectus lacustris formed big beds in Loch Aonghais (NF8573).

Exploring the machair and associated habitat northeast and southwest of Hornais, Clachan Sands – the former near Corran Ghoulabaidh (tetrads NF87T and 87Y), the latter part of Machair Robach (tetrad NF87T and a small part of 87S).

- a) More widely distributed species in these tetrads in suitable habitats (machair dune grassland and slacks).

<i>Ammophila arenaria</i>	<i>Koeleria macrantha</i>
<i>Anacamptis pyramidalis</i>	<i>Lathyrus pratensis</i>
<i>Anagallis tenella</i>	<i>Linum catharticum</i>
<i>Anchusa arvensis</i>	<i>Mentha aquatica</i>
<i>Anthyllis vulneraria</i> subsp. <i>vulneraria</i>	<i>Myosotis laxa</i>
<i>Avenula pubescens</i>	<i>Polygala vulgaris</i>
<i>Campanula rotundifolia</i>	<i>Potentilla anserina</i>
<i>Cardamine pratensis</i>	<i>Primula vulgaris</i>
<i>Carex arenaria</i>	<i>Ranunculus flammula</i>
<i>Carex demissa</i>	<i>Rhinanthus minor</i> subsp. <i>stenophyllus</i>
<i>Centaurium erythraea</i>	<i>Sedum acre</i>
<i>Cerastium diffusum</i>	<i>Succisa pratensis</i>
<i>Comarum palustre</i>	<i>Thalictrum minus</i>
<i>Dactylorhiza fuchsii</i>	<i>Thymus polytrichus</i>
<i>Eleocharis uniglumis</i>	<i>Trisetum flavescens</i>
<i>Euphrasia arctica</i> subsp. <i>borealis</i>	<i>Vicia cracca</i>
<i>Hydrocotyle vulgaris</i>	

- b) NF874767 sandy short grassland bank between car park and shore.

Coeloglossum viride
Dactylorhiza purpurella

- c) NF878772 by stream outfall of Allt Gulabaidh, mainly on upper strandline.

<i>Atriplex glabriuscula</i>	<i>Honckenya peploides</i>
<i>Cakile maritima</i>	<i>Tripleurospermum maritimum</i>

d) NF878773 etc. on moist machair.

A plant that appeared to be a hybrid between *Dactylorhiza ebudensis* and *D. fuchsii* occurred as well as:

Coeloglossum viride
Ophioglossum vulgatum

Pinguicula vulgaris
Selaginella selaginoides

e) NF880774 etc normally wet depressions (the habitat was markedly parched during our visit).

Caltha palustris
Dactylorhiza incarnata subsp. *coccinea*
Dactylorhiza incarnata subsp. *incarnata*
Dactylorhiza purpurella
Filipendula ulmaria

Galium palustre
Juncus balticus
Molinia caerulea
Pedicularis palustris
Salix repens

f) NF88327752 in slightly hummocky slack.

Calliergonella cuspidata
Caltha palustris
Carex dioica
Carex nigra
Carex panicea
Cynosurus cristatus
Dactylorhiza ebudensis
Dactylorhiza incarnata subsp. *coccinea*
Dactylorhiza incarnata subsp. *incarnata*
Dactylorhiza x latirella @ NF88357751
Danthonia decumbens
Eleocharis palustris

Eriophorum angustifolium
Holcus lanatus
Juncus articulatus
Pedicularis palustris
Pinguicula vulgaris
Plantago maritima
Prunella vulgaris
Rhytiadelphus squarrosus
Schoenus nigricans
Trifolium pratense
Triglochin maritima
Triglochin palustris

g) NF884776 as latter but with short sedges commoner.

Carex dioica
Carex pulicaris
Dactylorhiza x venusta

Figure 1: *Dactylorhiza x venusta*
(*D. fuchsii* x *D. purpurella*) in
machair near Clachan Sands

© Graham Goodfellow



h) NF882778 primary dune crest and adjacent shore.

The eel-grass was abundant stranded along whole length of beach here.

Elytrigia juncea

Zostera marina

i) NF871765 in upper part of fallow field.

Erodium cicutarium

Viola tricolor subsp. curtisii

j) NF869760 depressions in sheep-grazed machair.

Dactylorhiza ebudensis

Dactylorhiza purpurella

Neottia ovata

k) NF868759 area of quite closely grazed machair where tufts of *Schoenus* are frequent in a depression at corner of field near fences.

Known as a site for *Dactylorhiza* “*lapponica*” though this orchid was not seen on this occasion.

Anagallis tenella

Koeleria macrantha

Ophioglossum vulgatum

Pinguicula vulgaris

Thymus polytrichus white

NF798752 in shorter swards of machair near Malacleit, by track.

Cerastium diffusum

Coeloglossum viride

Honckenya peploides

Lotus corniculatus

Poa humilis

Ranunculus acris

Rhinanthus minor ⁴

Thalictrum minus

NF765534 to NF765531 and NF766533 Nunton (Benbecula)

Especially toward shore of Loch na Liana Moire. We focussed on the wet meadow between track and loch.

a) Wet meadow with shallow (presently dry) ditches.

Berula erecta

Carex diandra

Hippuris vulgaris

Lythrum portula

Oenanthe lachenalii

Sagina nodosa

Samolus valerandi

Schedonorus arundinaceus

Senecio aquaticus

Triglochin maritima

Triglochin palustris

Veronica scutellata

b) Shore and shallows of loch.

Alopecurus geniculatus

Eleocharis palustris

Eleogiton fluitans

Equisetum fluviatile

Littorella uniflora

Menyanthes trifoliata

c) Environs of ruined wall by farmstead at Nunton.

Aegopodium podagraria

Odontites vernus

3rd July 2018 (Benbecula, South Uist and Eriskay)

This day's exploration began with two short forays in southern Benbecula..

NF811484 shores of Loch na Creige Glaise etc near Hacklet.

This is a known as a site for *Spiranthes romanzoffiana* but we failed to find it. Just to north of this lochan is an inlet of the sea, called Ob Saile.

a) Freshwater lochan and shore.

Carex pulicaris
Dryopteris aemula
Eleogiton fluitans
Festuca vivipara

Littorella uniflora
Salix aurita
Sparganium angustifolium

b) Shore of sea inlet.

Armeria maritima
Juncus gerardii

NF8650 looking at coastal moorland by Caolas Orasaigh, Uisegeabhaigh at the end of the minor road from Hacklet.

Anagallis tenella
Calluna vulgaris
Carex binervis

Carex pilulifera
Carex pulicaris
Empetrum nigrum

Crossing onto South Uist, we made a series of stops on the west side of the island, spending most time near Dalabrog, again looking for the American Pondweed (*Potamogeton epiphydrus*).

NF775396 in and by portion of Loch Druidibeag cut off by causeway of B890.

a) In the loch itself.

Littorella uniflora
Lobelia dortmanna
Sparganium angustifolium

b) On the stony shore of loch.

Drosera anglica
Eleocharis uniglumis
Myrica gale

Pinguicula vulgaris
Ranunculus flammula
Ulex europaeus on slopes

c) NR774396 looking mainly at shrubbery and road verge by Hopewell Cottage but also a runnel/ditch (*) entering loch.

Aegopodium podagraria
Lysimachia punctata
Mentha x villosa

*Mimulus x robertsii**
Rosa rugosa

Taking the access track from the A865 to the phone mast on Aisgerbheinn and parking near NF754230, we walked east to Lochs Fada and Crocabhat, exploring the shores.

a) Moist margins of track at NF754230.

Alchemilla mollis
Senecio x ostenfeldii

b) Moorland slopes between Lochs Fada and Crocabhat at NF759227, including boggy flats, flushes and below rocks.

Dryopteris aemula *Rhynchospora alba*
Dactylorhiza fuchsii *Schoenus nigricans*

c) NF760223 Southwest shore of Loch Fada, in shallows or on stony shore. There was no sign of *Potamogeton epihydrus* though the BSBI DDb gives the precise location as NF76062249 – on the NE shore – and thus our search may have been wrongly targeted.

Drosera anglica *Nymphaea alba subsp. occidentalis*
Littorella uniflora *Phragmites australis*
Lobelia dortmanna *Potamogeton natans*
Menyanthes trifoliata

d) NF758226 etc Far eastern end of Loch Crocabhat in shallows, stony shore and on rock crevices just above shore.

Drosera anglica *Nymphaea alba occidentalis*
Drosera intermedia *Osmunda regalis* (2 tiny plants)
Lobelia dortmanna *Sorbus aucuparia*

e) NF75882269 inlet at far north-eastern corner of Loch Crocabhat near stream outfall – shallow still water with much cast up material.

Eleogiton fluitans *Potamogeton epihydrus* (submerged
Juncus bulbosus (aquatic form) leaves/stem)
Potamogeton natans

NF757172 lines of peat blocks by B888 near Buaile Dubh.

Adjacent moist grassland and roadside ditch.

Dactylorhiza fuchsii hebridensis *Epilobium palustre*
Eleogiton fluitans *Platanthera bifolia*

We made a very brief visit to Eriskay, stopping at NF787107 to look at roadside rocks and turf on the highest point of the minor road to the Barra ferry at Coilleag:

Anthyllis vulneraria subsp. vulneraria *Leontodon saxatilis*
Asplenium adiantum-nigrum *Poa humilis*
Danthonia decumbens *Salix repens*
Koeleria macrantha *Sedum anglicum*
Leontodon hispidus

Oenanthe fistulosa was notably frequent in and by roadside ditches near Cille Pheadair at NF740197.

NF734201 near Aisled House, Cille Pheadair (Kilpheder).

- a) Sandy grassland at end of lane, with moister depressions.

<i>Anacamptis pyramidalis</i>	<i>Gnaphalium uliginosum</i>
<i>Avenula pubescens</i>	<i>Thalictrum minus</i>
<i>Dactylorhiza fuchsii</i> (large pale)	<i>Viola tricolor subsp. curtisii</i>

- b) Fallow strip:

<i>Anchusa arvensis</i>	<i>Fallopia convolvulus</i>
<i>Avena strigosa</i>	<i>Secale cereale</i>
<i>Chenopodium album</i> ⁴	<i>Sinapis arvensis</i>

At this point, the “forward party” (Ann Skinner, Graham Goodfellow, Hilary Wallace, Ciara Sugrue and Owen Mountford) was joined at the Isle of Benbecula House Hotel by the rest of the FMP group and other participants guided by Patrick Hughes (SNH).

A brief evening outing took us to NF7849 south of Lionacleit, where we looked at areas of fallow and cultivated machair, finding the following in *Secale* strips:

<i>Anchusa arvensis</i>	<i>Papaver dubium sens. strict.</i>
<i>Erodium cicutarium</i>	<i>Polygonum aviculare sens. strict.</i>
<i>Euphorbia helioscopia</i>	<i>Polygonum boreale</i>
<i>Glebionis segetum</i>	<i>Sinapis arvensis</i>
<i>Lamium amplexicaule</i>	<i>Urtica urens</i>
<i>Lamium hybridum</i>	

4th July 2018 (South Uist)

NF7317 and 7318

The group examined an area of hay-meadows and associated habitats north of the burial ground adjacent to North and South Boisdale toward Kilpheder.

- a) NF736173 more disturbed ground in and around cemetery.

<i>Artemisia vulgaris</i>	<i>Galium aparine</i>
<i>Bromus hordeaceus sens. strict.</i>	<i>Plantago coronopus</i>

- b) NF736175 fallow and cereal crop near cemetery.

<i>Anagallis arvensis</i>	<i>Odontites vernus</i>
<i>Anchusa arvensis</i>	<i>Papaver dubium sens. strict.</i>
<i>Avena strigosa</i>	<i>Spergula arvensis</i>
<i>Glebionis segetum</i>	

- c) NF736175 Rougher grassland by track to meadows and trampled parts of track itself.

<i>Agrostis stolonifera</i>	<i>Matricaria discoidea</i>
<i>Crepis capillaris</i>	<i>Potentilla anserina</i>
<i>Galium verum</i>	<i>Scorzoneroideis autumnalis</i>
<i>Juncus bufonius sens. strict.</i>	<i>Thalictrum minus</i>

d) Hay meadows, to east of track, focussing especially on those at NF736181 and NF736185.

<i>Bellis perennis</i>	<i>Juncus articulatus</i>
<i>Carex nigra</i>	<i>Juncus bufonius sens. strict.</i>
<i>Centaurea nigra</i>	<i>Lolium perenne</i>
<i>Cerastium fontanum</i> subsp. <i>vulgare</i>	<i>Myosotis laxa</i> subsp. <i>cespitosa</i>
<i>Cynosurus cristatus</i>	<i>Neottia ovata</i> @ NF73571848
<i>Dactylis glomerata</i>	<i>Persicaria amphibia</i>
<i>Dactylorhiza fuchsii</i>	<i>Plantago lanceolata</i>
<i>Dactylorhiza incarnata</i>	<i>Prunella vulgaris</i>
<i>Equisetum fluviatile</i>	<i>Ranunculus acris</i>
<i>Equisetum palustre</i>	<i>Ranunculus repens</i>
<i>Epilobium palustre</i>	<i>Rhinanthus minor</i>
<i>Epilobium parviflorum</i>	<i>Rumex acetosa</i>
<i>Euphrasia arctica</i> subsp. <i>borealis</i>	<i>Senecio aquaticus</i>
<i>Festuca rubra</i>	<i>Silene flos-cuculi</i>
<i>Heracleum sphondylium</i>	<i>Trifolium pratense</i>
<i>Holcus lanatus</i>	<i>Trifolium repens</i>
<i>Hypochaeris radicata</i>	<i>Vicia cracca</i>
<i>Iris pseudacorus</i>	

NF731229-735223

Helen Doherty and Patrick Hughes led us to Loch Hallan, where we examined the transition between the loch, reed-swamp, wet grassland and machair. Our route took us north from the cemetery and Cladh Hallan (where *Thalictrum minus* frequent). Loch Hallan is designated as an example of a hard water Chara-dominated lake in the South Uist machair Special Area of Conservation; this is a rare lake type in the UK.

a) Generally distributed species.

<i>Angelica sylvestris</i>	<i>Neottia ovata</i>
<i>Avenula pubescens</i>	<i>Phragmites australis</i>
<i>Cardamine pratensis</i>	<i>Pinguicula vulgaris</i>
<i>Carex disticha</i>	<i>Ranunculus acris</i>
<i>Dactylorhiza fuchsii</i>	<i>Schoenoplectus tabernaemontani</i>
<i>Dactylorhiza incarnata</i> subsp. <i>coccinea</i>	<i>Silene flos-cuculi</i>
<i>Hydrocotyle vulgaris</i>	<i>Triglochin maritima</i>
<i>Menyanthes trifoliata</i>	<i>Vicia cracca</i>
<i>Molinia caerulea</i>	

b) NF7313922959 Undisturbed transition to reedbed.

<i>Angelica sylvestris</i>	<i>Neottia ovata</i>
<i>Centaurea nigra</i>	<i>Phragmites australis</i>
<i>Dactylorhiza fuchsii</i>	<i>Poa humilis</i>
<i>Dactylorhiza maculata</i> subsp. <i>ericetorum</i>	<i>Ranunculus acris</i>
<i>Hierochloa odorata</i>	<i>Silene flos-cuculi</i>
<i>Lathyrus pratensis</i>	<i>Triglochin maritima</i>
<i>Molinia caerulea</i>	<i>Vicia cracca</i>

(*Hierochloa* also at NF7309923037).

c) NF7348722339 rutted and disturbed transition from reedbed to wet grassland.

<i>Centaurea nigra</i>	<i>Ranunculus acris</i>
<i>Hierochloa odorata</i>	<i>Ranunculus flammula</i>
<i>Holcus lanatus</i>	<i>Silene flos-cuculi</i>
<i>Phragmites australis</i>	

d) NF73522236 reedier area toward lake.

<i>Caltha palustris</i>	<i>Phragmites australis</i>
<i>Cicuta virosa</i>	<i>Schoenoplectus lacustris</i>
<i>Hydrocotyle vulgaris</i>	<i>Schoenoplectus tabernaemontani</i>

e) NF735223 shallow water of Loch Hallan; much of the loch is very shallow (<20 cm depth) and hence it was possible to explore large areas by wading.

<i>Chara aspera</i>	<i>Potamogeton gramineus</i>
<i>Myriophyllum spicatum</i>	<i>Potamogeton hybrid</i>

NF7536 by the chapel near Tobha Mor, looking at non-meadow habitats.

The FMP group recorded meadow quadrats to the north.

a) In disturbed sandy grassland.

<i>Arctium minus</i> sens. strict.
<i>Polygonum boreale</i>
<i>Thalictrum minus</i>

b) Shallow water of Loch an Eilean, which is noted in the Special Area of Conservation designation as another example of a hard water loch with *Chara* spp. but this loch has a species composition more characteristics of a rarer lake type i.e. oligotrophic waters of sandy plains.

<i>Apium inundatum</i>	<i>Littorella uniflora</i>
<i>Baldellia ranunculoides</i>	<i>Myriophyllum spicatum</i>
<i>Carex rostrata</i>	<i>Potamogeton gramineus</i>

5th July 2018 (North Uist and Benbecula)

The full group explored broadly the same regions as the smaller party had on 2nd July but, apart from Nunton, visiting different sites.

NF887727

We broke the journey at the Fairy Knoll picnic area and especially the brackish lagoon

which has been formed where A865 causeway cuts it off from the sea near Aileodair. *Dryopteris aemula* grows on moorland banks by the lagoon, and the following were observed in shallow stony brackish water by picnic area:

Lamprothamnium papulosum

Ruppia cirrhosa

Zostera marina (cast up)

NF811751 etc machair meadows at Sollas on east side of track from main road.

Mosaic of plant communities including some MG8 (Rodwell 1992), as well as dry grassland, mire and swamp, as well as seasonally flooded depressions (e.g. at NF811753 where *Catabrosa* frequent). Some areas exceptionally rich with at least 43 species per square metre.

Alopecurus geniculatus

Apium nodiflorum

Callitriche cf platycarpa

Carex demissa

Carex disticha

Carex dioica

Carex lepidocarpa

Carex panicea

Catabrosa aquatica

Comarum palustre

Coeloglossum viride

Dactylorhiza incarnata subsp. *coccinea*

Dactylorhiza purpurella

Equisetum fluviatile

Equisetum palustre

Euphrasia arctica subsp. *borealis*

Glyceria fluitans

Hippuris vulgaris

Menyanthes trifoliata

Nasturtium officinale sens. strict.

Pedicularis palustris

Pinguicula vulgaris

Sagina nodosa

Selaginella selaginoides

Triglochin maritima

Triglochin palustris

a) In ditches by access track

*Nasturtium x sterile*⁶

Veronica anagallis-aquatica

NF7070 At Balranald nature reserve (RSPB), although we did look at the grassy dunes (finding *Coeloglossum viride* on the banks of a grassy dune hollow at NF701702), we spent most of our time in areas of ploughed machair left fallow for one year and two years. As well as relic *Secale* and *Avena strigosa*, these strips contained:

Anchusa arvensis

Anthyllis vulneraria subsp. *vulneraria*

Arenaria serpyllifolia sens. lat.

Daucus carota

Erodium cicutarium

Glebionis segetum

Honckenya peploides

Papaver dubium sens. strict.

Scorzoneroideis autumnalis var. *simplex*

Thalictrum minus

Tripleurospermum maritimum

Viola tricolor subsp. *curtisii*

NF733686 Loch Sanndaraigh near Paible.

- a) Wet/moist grassland and transition to dry acid grassland around loch.

<i>Carex disticha</i>	<i>Linum catharticum</i>
<i>Comarum palustre</i>	<i>Oenanthe lachenalii</i>
<i>Dactylorhiza purpurella</i>	<i>Molinia caerulea</i>
<i>Hydrocotyle vulgaris</i>	<i>Salix repens</i>
<i>Juncus acutiflorus</i>	<i>Triglochin maritima</i>

- b) Species on the loch shore mainly north of the causeway, or in the loch waters (both shallows with a sandy bottom and deeper water). Much of the loch bottom was covered in a charophyte lawn whose composition was not worked out. In the shallows there were collections of spherical dark green gelatinous objects; these were thought to be colonies of *Nostoc pruniforme* but, without a microscope, we were not able to confirm this identification.

<i>Apium inundatum</i>	<i>Menyanthes trifoliata</i>
<i>Baldellia ranunculoides</i>	<i>Myriophyllum alterniflorum</i>
<i>Callitriche hermaphrodita</i>	<i>Persicaria amphibia</i>
<i>Carex rostrata</i>	<i>Potamogeton cf berchtoldii?</i>
<i>Chara virgata</i>	<i>Potamogeton gramineus</i>
<i>Eleocharis palustris</i>	<i>Potamogeton natans</i>
<i>Elodea nuttallii</i>	<i>Potamogeton x nitens</i>
<i>Equisetum fluviatile</i>	<i>Potamogeton perfoliatus</i>
<i>Fontinalis antipyretica</i>	<i>Ranunculus baudotii</i> ⁸
<i>Littorella uniflora</i>	<i>Sparganium erectum</i>

NF766532

We returned to the wet meadow by Loch na Liana Moire near Nunton (see 2nd July 2018). Although quadrats were recorded in the meadow, an additional focus this time was the loch shore.

- a) Dry rocky bluff on east side of northern inlet of loch.

<i>Aira praecox</i>	<i>Danthonia decumbens</i>
<i>Antennaria dioica</i>	<i>Salix repens</i>

- b) NF7661353246 shallow peaty water on wet side of northern inlet.

<i>Apium nodiflorum</i>	<i>Potamogeton coloratus</i>
<i>Myriophyllum alterniflorum</i>	<i>Potamogeton gramineus</i>
<i>Myriophyllum spicatum</i>	<i>Potamogeton natans</i>

Among the beds of *P. coloratus* were some plants that appeared to be *Potamogeton x billupsii*, known from this lake since 1935 but with most localised records slightly further south (NF765528, NF764531, NF765530, NF765531). However, the material recovered was rather tattered and thus a definitive identification was not possible.

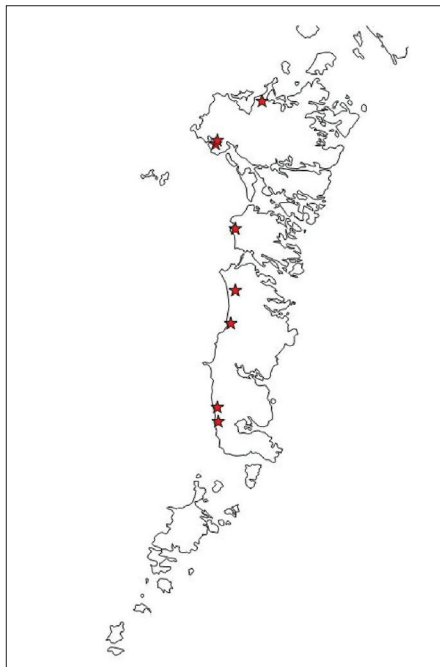
The following morning, the lead author flew back to Glasgow. The rest of the group followed in the afternoon, having recorded more quadrats in wet grassland near Loch

Bi on South Uist.

Hebridean Meadows in a UK context

The objective of the site visits by FMP was to assess the range and extent of wet meadows and pastures on the blacklands, behind the machair, in the context of the revised classification of the Calthion group of communities (Wallace and Prosser 2017). This classification updates that originally published in the NVC (Rodwell 1992, 2000). Increasing our understanding of the link between dune slack and damp meadow grassland was also a topic of interest.

Map 1: Locations of seven Hebridean grassland sites where quadrats were recorded in wet meadows



Seven sites were visited (Table 1 and Map 1), many of which were exceptionally species rich, with up to 43 species in a 1 m² quadrat. A total of 111 species were recorded in the sample of 23 quadrats; the most frequent species being nine graminoids (*Agrostis stolonifera*, *Anthoxanthum odoratum*, *Cynosurus cristatus*, *Festuca rubra*, *Holcus lanatus*, *Poa trivialis*, *Carex nigra* and *Juncus articulatus*), six forbs (*Bellis perennis*, *Caltha palustris*, *Cerastium fontanum*, *Ranunculus acris*, *Silene flos-cuculi* and *Trifolium repens*) and a moss (*Calliergonella cuspidata*). So far, only some of the data have been input, thus the allocation of NVC units is provisional and likely to become clearer when the full range of samples has been analysed.

The sites that were managed for hay, Sollas and Kilpheder, appeared to support vegetation that was close to the newly described *Caltha palustris*-*Bellis perennis*

subcommunity of *Cynosurus cristatus*-*Carex panicea*-*Caltha palustris* grassland (MG8d), a unit that is concentrated in the north of England (Wallace and Prosser 2017). Many of the grazed sites, which tended to have damper soils, still appeared intermediate in their floristic composition between the *Potentilla anserina*-*Carex nigra* dune slack community (SD17) and MG8c, the *Carex nigra*-*Ranunculus flammula* subcommunity of *Cynosurus cristatus*-*Carex panicea*-*Caltha palustris* grassland. The exception was Loch Bi where much of the vegetation was clearly closer to the MG8c subcommunity, grading to SD17 in places.

This close association between MG8 and SD17 has been noted by Rodwell (2000) and also by earlier users of the NVC in Somerset and it seems that analysis of an expanded data-set (including existing data from the sand dune survey and additional data from the meadows and pastures) is needed to unravel the botanical and hydrological distinctions between the two.

Table 1: Hebridean grassland sites assessed by the Floodplain Meadows Partnership with their management, number of quadrats recorded and NVC types to which the grassland has been allocated

Site name	Grid Reference (centred on)	Management	Quadrats sampled	NVC units	
				Best fit	Other units present
Sollas	NF811754	Hay meadows	19	MG8d	MG8c
Loch Sanndaragh/ Paibeil	NF730680	Meadow	10	MG8c	MG14b
	NF733685	Lake margin	3	M25	M26
Nunton – by Loch na Liana Moire	NF764533	Pasture	5	?	
Loch Bi	NF764425-764433	Pasture	9	MG8d	MG8c/SD17
Howmore/ Tobha Mor	NF757368	Hay	11	SD17c	MG8d
Loch Hallan	NF734223	Cultivated machair	2	MG8b	SD17c
Kilpheder	NF736189	Hay	12	MG8d	

Summary

The primary objective of our visit was to investigate grasslands whose floristic composition appeared closely related to some types of lowland wet grassland elsewhere in the UK. Our observations confirmed this close relationship, and showed that these meadows and pastures form an extremely valuable botanical resource, not only at a Hebridean but at a national scale. Unfortunately, these grasslands fall largely outside

the current conservation designations for the dunes and associated machair areas on the Hebrides. Their effective conservation may require a revision of the designations and management plans.

However, our attention was by no means restricted to these wet grasslands. To botanists from the south of England, the special joy of a visit to the Outer Hebrides is the apparent integrity and diversity of so much of the vegetation, with (semi-) natural habitats covering the landscape. Many of these habitats and vegetation types contain species that have decidedly declined in lowland England, often to the point of extinction, but on the Outer Hebrides are frequent, even locally abundant. The variety of loch types in such a small area is remarkable with transitions of fresh-brackish-saline and acidic to calcareous occurring within very short distances. Furthermore, unlike many waterbodies further south, most of those we visited appear to have been spared the ravages of nutrient enrichment from artificial fertilisers, intensive livestock of human development. In addition, some plant genera are especially diverse here e.g. marsh-orchids (*Dactylorhiza*), pondweeds (*Potamogeton*) and eyebrights (*Euphrasia*). Their location on the Atlantic fringe of Europe is reflected in the presence of some species whose centre of distribution is in North America e.g. Irish Lady's-tresses (*Spiranthes romanzoffiana*) and American Pondweed (*Potamogeton epihydrus*).

Two of our group (JOM and SJC) were naturalised Fenmen, and were thus particularly interested to visit Loch na Liana Moire at Nunton. The hybrid between Fen Pondweed and Various-leaved Pondweed (*Potamogeton x billupsii*) has only ever been known at two locations, here on Benbecula and at Benwick in Cambridgeshire just 10-15 km from where both Stewart and Owen grew up. Sadly, this distinctive pondweed died out in Fenland over a century ago.

Comparing our records with those published in Preston et al. (2002) or on the BSBI database suggests that botanists visiting from elsewhere may make their biggest contribution by looking at roadsides or around buildings, where garden escapes and other species not native to these islands are more likely to occur. Visitors will understandably tend to focus on the riches of the native flora, but they should not neglect the apparently familiar, which they are tempted to dismiss as ubiquitous. For example, our observation of Petty Spurge (*Euphorbia peplus*) on Benbecula may, surprisingly, be amongst the most important records made during the visit!

We hope that this account of our travels is stimulating not only to other visiting botanists but also encourages local naturalists to share their observations of the remarkable riches of these islands.

Acknowledgements

Apart from the authors of this article, other members of the Floodplain Meadows Partnership were present and participated in the field excursions, including the recording of meadow quadrats: Sue Townsend, Richard Jefferson, Dominic Coath, Matt Johnson, Mike Dodd, Irina Tatarenko, Clare Lawson and Ann Skinner. Our visit was much aided both by Scottish Natural Heritage staff with detailed knowledge of the

islands (Helen Doherty, Debbie Spray and Patrick Hughes) and by scientists who had conducted or planned research on these Outer Hebridean grasslands (Robin Pakeman of the James Hutton Institute and Ciara Sugrue). Special mention should be made of Graham Goodfellow who accompanied the whole of the trip, contributing detailed knowledge (and photographs) of the remarkable variation in *Dactylorhiza* taxa present on these islands. Finally, we are grateful to Paul Smith (Botanical Society of Britain and Ireland recorder for vice-county 110) who commented on a preliminary report of our visit to these islands.

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Notes on variation and identification in some species

(recorded generally on the islands unless a location is specified).

1. The pyramidal orchids near the airport were notably dark-coloured.
2. Many plants of *Ranunculus acris* were notably large-flowered
3. Plants of *Crepis capillaris* were hairier than is typical elsewhere in the UK
4. The yellow rattle at this location seemed intermediate between subsp. *monticola* and subsp. *stenophyllus*.
5. *Chenopodium album* is seemingly always a coarse toothed form
6. The watercress was identified as this hybrid at the time, and there are also records by Richard Pankhurst from 2006. However Paul Smith (BSBI recorder for the Outer Hebrides) has not seen the taxon in the vice-county.
7. This identification is probable only, as we were unable to distinguish the material from *P. pusillus* in the field.
8. At this location, the form of *Ranunculus baudotii* without laminar leaves